

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|  |  |   |
|--|--|---|
| Applicant's or agent's file reference<br>FIS920020099    | <b>FOR FURTHER<br/>ACTION</b>  | see Notification of Transmittal of International Search Report<br>(Form PCT/ISA/220) as well as, where applicable, item 5<br>below. |
| International application No.<br>PCT/US02/41396          | International filing date ( <i>day/month/year</i> )<br>23 December 2002 (23.12.2002) | (Earliest) Priority Date ( <i>day/month/year</i> )  |
| Applicant<br>INTERNATIONAL BUSINESS MACHINES CORPORATION |  |   |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the Report**

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 1



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.



None of the figures

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/41396

## Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

### NEW ABSTRACT

A bandpass delta sigma truncator that truncates multi-bit digital input signals to digital output signals (24) having a selected number of the most significant data bits of the digital input signals and a method of truncating multi-bit digital signals. The remaining least significant data bits (3) of the input signals are (a) time delayed (26) by a period of time equal to the time between successive input signals and multiplied by a number (30) related to the ratio of a selected frequency to the frequency of the input signals and the results of the multiplication are added (32) to sign extensions (11) of the input signals, and (b) time delayed by a period of time equal to twice the time between successive input signals and after inversion (28) are added (32) to the sign extensions of the input signals.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/41396

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : H04B 1/10; H03B 21/00; H03H 7/30

US CL : 375/232, 233, 350; 331/18; 341/144

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 375/232, 233, 350; 331/18; 341/144

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
USPAT, US-PGPUB, EPO, JPO, DERWENT**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                       | Relevant to claim No. |
|------------|--|-----------------------|
| Y          | US 2002/0012411 A1 (HEINZL et al.) 31 January 2002 (31.12.2002), Figs. 12-13; paragraphs 0124-0125, 0136 | 1-10                  |
| Y          | US 5,910,960 A (CLAYDON et al.) 08 June 1999 (08.06.1999), col. 11, lines 20-30, col. 23, lines 31-63.   | 1-10                  |
| Y          | US 2002/0008588 A1 (KHAN) 24 January 2002 (21.01.2002), Fig. 6, paragraphs 0045-0046, 0048-0049.         | 1-10                  |
| Y          | US 6,249,238 B1 (STEINLECHNER) 19 June 2001 (19.06.2001), col. 6, lines 16-37                            | 1-10                  |
| Y          | US 5,581,253 A (BROWN) 03 December 1996 (03.12.1996), col. 1, lines 5-30, 42-52, col. 9, lines 46-67.    | 1-10                  |
| Y          | US 6,389,069 B1 (MATHE) 14 May 2002 (14.05.2002), col. 1, lines 5-30, 42-52, col. 9, lines 46-67.        | 1-10                  |

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;"

document member of the same patent family.

Date of the actual completion of the international search

15 April 2003 (15.04.2003)

Date of mailing of the international search report

09 MAY 2003

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